REMARKS

By this amendment, claims 1-10, 29-38, 43, and 47-57, are pending in the application. Of these, claims 1, 3, 9, 10, 29, 31 and 36 are being amended, and claims 48-57 are being added. Claims 11-28, 39-42 and 44-46 are being withdrawn. The amendments and newly added claims are fully supported by the originally filed specification and original claims and add no new matter. For example, claims 54-55 are supported by the first full paragraph on page 6. Entry of the amendments and reconsideration of the present case is respectfully requested.

Objected to Claims

Applicants appreciate the Examiner's indication that claims 38 and 47 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112, second paragraph, and including all of the limitations of the base claim and any intervening claims. These claims have been re-written in independent form as claims 48 and 51, respectively, and the 112 rejections are being traversed. Accordingly, claims 48 and 51 and the claims depending therefrom are believed to be allowable.

Restriction Requirement

The Examiner required restriction among two sets of claims, Group 1, drawn to a component with a Y-Al compound coating, as defined by the Examiner, and Group II, drawn to a method of coating a structure with a Y-Al compound coating, as defined by the Examiner. A provisional election was made by telephone on June 2, 2003 to prosecute the claims of Group 1, namely claims 1-10, 28-38, 43 and 47.

Applicants affirm this election of the claims of Group I, and the claims of Group II, namely claims 11-28, 39-42 and 44-46 are being withdrawn without prejudice or disclaimer. Applicants reserve the right to pursue the withdrawn claims in a divisional application.

Information Disclosure Statement

As the Examiner was not able to access the pdf item listed on the IDS filed April 29, 2002, the pdf document has been printed from the cited website and is being provided herewith, in addition to other references.

Rejection Under 35 U.S.C. 112, Second Paragraph, of Claims 1-10, 29-38, 43 and 47

The Examiner rejected claims 1-10, 29-38, 43 and 47 under 35 U.S.C. 112, second paragraph. This rejection is traversed.

The Examiner rejected claims 1-10 and 36-38 because "it is unclear whether the claimed article is necessarily to be part of a substrate processing chamber or whether the claimed article is to have the intended use of a substrate processing chamber component." Claim 1 recites "a substrate processing chamber component," which clearly indicates to one of ordinary skill in the art that the recited component is a structure that is part of a processing chamber that processes substrates, for example to etch or deposit material on the substrates, as is described in the specification. The component can be, for example, a portion of a chamber wall, a substrate support or a gas energizer, or other components or portions of a substrate processing chamber, as described in the specification. Accordingly, as claim 1 clearly recites a component that is a part of a substrate processing chamber, and hence is a "substrate processing chamber component," claim 1, the claims depending therefrom, and other claims reciting the phrase "substrate processing chamber component" are not indefinite, and should not be rejected under 35 U.S.C. 112, second paragraph.

The Examiner rejected claims 1, 3, 9, 10, 29, 31 and 36 because "it is unclear whether the term 'structure' refers to a description of an integral surface coating or to a substrate on which is to disposed an integral surface coating." Claim 1 recites a "structure having an integral surface coating," and thus recites a structure that has a coating that is integral with the structure, as would be clear to one of ordinary skill in the

art. The Examiner asks whether the term "structure" could refer to a description of the integral surface coating. However, this interpretation of the claim is flawed, because by definition a coating "coats" another object (in this case the structure.) Thus, if the entire structure were the coating, the definition of a coating would be contradicted, as the coating would not coat anything. Accordingly, one of ordinary skill in the art would clearly understand that the term "structure" refers to the object over which the integral surface coating is coated, and the claims reciting this term are not indefinite under 35 U.S.C. 112, second paragraph.

The Examiner rejected claims 1, 2, 5, 8, 29, 30, 33, 43 and 47 because "it is unclear what is meant by the phrase 'integral surface coating." This phrase is clearly defined in the specification to mean a coating that forms a "unitary and continuous structure that is absent a discrete and sharp crystalline boundary layer with the structure" (paragraph 25.) In particular, the integral surface coating can be formed by "'growing' the surface coating 117 out of the structure of which the component 114 is fabricated" (paragraph 25.) This is in contrast to, for example "plasma sprayed coatings which have a discrete boundary between the coating and the underlying structure" (paragraph 25) because the plasma sprayed coatings are attached or applied to a surface of the underlying structure, rather than being formed from, or being incorporated into, the structure itself. For example, in one version, the integral coating can be formed by anodizing a yttrium and aluminum alloy to "grow" a coating having yttrium-aluminum oxide on the alloy. In another version, the integral coating is formed by implanting ions into a surface of the structure, and optionally, annealing or anodizing the structure. The coating formed by the ion-implantation method is integral to the structure because the ions have been inserted into the pre-existing crystalline pattern of the structure, and thus there is no discrete or sharp boundary layer between the ion implanted coating and underlying coating. Accordingly, as the recited integral surface coating is clearly defined in the specification, one of ordinary skill in the art would understand what is meant by the recitation of "integral surface coating," and the claims reciting this term are not indefinite under 35 U.S.C. 112, second paragraph.

The Examiner rejected claims 2 and 30 because "it is unclear what is meant by the phrase 'anodized coating.'" The definition of anodize, according to Merriam Webster's online dictionary, is "to subject (a metal) to electrolytic action as the anode of a cell." The specification does not conflict with this definition, and discloses that, in one version, "the metal alloy is anodized by electrolytically reacting the surface 113 of the metal alloy with an oxidizing agent" (paragraph 36) for example the alloy can be placed in an oxidizing solution and "electrically biased" (paragraph 36.) The specification further discloses that "metal alloy may also be at least partially anodized by exposing the metal alloy to an oxygen-containing gas (paragraph 37.) Thus, as a part of the anodization process, the metal alloy can be exposed to an oxygen-containing gas to oxidize the surface. However, this section does not disclose that anodization occurs absent electrolytic action. Thus the recited anodized coating is not the same as an ordinary surface oxidation coating that is formed absent electrolytic action as this interpretation would not only contradict the disclosure, but also the accepted meaning of the term anodize. Furthermore, the specification clearly discloses that an anodized coating is a coating that is formed by the process of anodization. Accordingly, one of ordinary skill in the art would understand what is meant by the term "anodized coating," and the claims reciting this term should not be rejected under 35 U.S.C. 112, second paragraph.

The Examiner rejected claims 9 and 10 for having improper antecedent basis for the phrase "underlying structure." Claims 9 and 10 are being amended to remove the term "underlying," and thus these claims have proper antecedent basis from claim 1.

Rejection Under 35 U.S.C. 102 of claims 1-10 and 43

The Examiner rejected claims 1-3, 5, 6 and 8 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 3,754,903 to Goward et al. This rejection is traversed.

Claim 1 is not anticipated by Goward et al. because Goward et al. does not teach "a substrate processing chamber component comprising a metal structure having an integral surface coating of an yttrium-aluminum compound," as recited in the claim. Goward et al. discloses "a coating alloy for the gas turbine engine super-alloys" (abstract.) Thus, Goward et al. discloses a coating suitable for a gas turbine engine used, for example, to propel a jet airplane, but does not teach a component for a processing chamber in which a substrate is processed, as in the claim. Furthermore, Goward et al. does not teach an integral coating, and instead discloses that "the alloy is applied as a coating to the surface to be protected" (emphasis added column 4, lines18-19.) Thus, Goward et al. discloses applying or attaching a separate alloy coating to a surface of a structure, but does not teach forming an integral coating that is absent a discrete boundary layer with the structure and that is unitary with the structure. Accordingly, as Goward et al. does not teach a substrate processing chamber component having the recited integral surface coating, claim 1 and the claims depending therefrom are not anticipated by Goward et al.

The Examiner rejected claims 1-3, 5, 6, 8 and 43 under 35 U.S.C. 102(a) and (e) as being anticipated by U.S. Patent No. 6,287,644 to Jackson et al. This rejection is traversed.

Claim 1 is not anticipated by Jackson et al. because Jackson et al. does not teach "a substrate processing chamber component comprising a metal structure having an integral surface coating of an yttrium-aluminum compound," (emphasis added) as recited in the claim. Instead, Jackson et al. discloses "aluminide-based bond coat on articles exposed to high temperatures, such as components of turbines and engines" (emphasis added, column 1, lines 13-15.) Thus, Jackson et al. discloses a bond coat for a turbine or engine in which high temperatures occur, but does not teach a component for a substrate processing chamber. Furthermore, Jackson et al. does not teach an integral surface coating, and instead discloses that the bond coat can be made by "electron beam (EB) evaporation and deposition processes." (Column 6, lines 24-25.) Thus, Jackson et al. discloses forming a coating by depositing or adding coating

material on top of a structure, but does not teach forming a coating that is integral with the structure. Accordingly, as Jackson et al. does not teach the recited substrate processing chamber component, claim 1 and the claims depending therefrom are not anticipated by Jackson et al.

The Examiner rejected claims 1-5 and 8 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,807,613 to Aguero et al. This rejection is traversed.

Claim 1 is not anticipated by Aguero et al. because Aguero et al. does not teach "a substrate processing chamber component comprising a metal structure having an integral surface coating of an yttrium-aluminum compound" as recited in the claim. (Emphasis added.) Instead, Aguero et al. discloses a protective coating for the "high temperatures and corrosive environment characteristic of operating gas turbines" (column 1, lines 23-24) and "corrosive environments such as coal gasification systems, furnace fixtures, heating elements, heat exchangers, components for automotive and fossil energy applications as well as for nuclear reactors, chemical processing equipment and molten carbonate fuel cells" (column 1, lines 29-33.) However, Aguero et al. does not disclose a component having a coating that is a part of a chamber that processes substrates. Accordingly, as Aguero et al. does not teach the recited substrate processing chamber component having the integral coating, claim 1 and the claims depending therefrom are not anticipated by Aguero et al.

The Examiner rejected claims 1-8 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application No. 2002/0012791 to Morita et al. This rejection is traversed.

Claim 1 is not anticipated by Morita et al. because Morita et al. does not teach "a substrate processing chamber component comprising a metal structure having an integral surface coating of an yttrium-aluminum compound," (emphasis added) as recited in the claim. Instead, Morita et al. discloses "a ceramics material characterized by comprising a base material substantially made of a sintered body of alumina and a

yttrium-aluminum-garnet (YAG) layer having a thickness of 2 μm or more which is formed on a surface of the base material" (paragraph 13.) Thus, Morita et al. discloses a ceramic base, namely alumina, that has a YAG layer, but does not teach a metal structure having an integral surface coating. Accordingly, as Morita et al. does not teach the metal structure of the claim, claim 1 and the claims depending therefrom, are not anticipated by Morita et al.

The Examiner rejected claims 1-10 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,477,937 to Murakawa et al. This rejection is traversed.

Claim 1 is not anticipated by Murakawa et al. because Murakawa et al. does not teach "a substrate processing chamber component comprising a metal structure having an integral surface coating of an yttrium-aluminum compound" as recited in the claim. (Emphasis added.) Instead, Murakawa et al. discloses " a corrosion-resisting ceramic material having high resistance to corrosive halogen-based gases" (column 1, lines 7-9.) Thus, Murakawa et al. discloses a ceramic material, but does not teach a metal structure having a coating. Furthermore, Murakawa et al. does not disclose a structure having an integral surface coating, and instead discloses a window member "in the form of a transparent substrate of, for example, glass or sapphire having a surface to which a thin YAG sintered body is applied" (column 13, lines 59-62.) Thus, Murakawa discloses applying a sintered YAG ceramic to a surface to find a coating, but does not teach forming a coating that is integral with a structure, and that is thus absent a discrete boundary layer with the structure. Accordingly, claim 1 and the claims depending therefrom are not anticipated by Murakawa et al.

Rejection Under 35 U.S.C. 103(a) of Claims 9-10, 29-35, 36-37

The Examiner rejected claims 9 and 10 under 35 U.S.C. 103(a) as being unpatentable over Aguero et al. This rejection is traversed.

Claim 1, from which claims 9 and 10 depend, is patentable over Aguero et

al. because Aguero et al. does not teach or suggest "a substrate processing chamber component comprising a metal structure having an integral surface coating of an yttrium-aluminum compound," as recited in the claim. As discussed above, Aguero et al. discloses a protective coating for the "high temperatures and corrosive environment characteristic of operating gas turbines" (column 1, lines 23-24) and "corrosive environments such as coal gasification systems, furnace fixtures, heating elements, heat exchangers, components for automotive and fossil energy applications as well as for nuclear reactors, chemical processing equipment and molten carbonate fuel cells" (column 1, lines 29-33.) However, Aguero et al. does not teach or suggest a component for a substrate processing chamber in which substrates are processed, for example, to etch features or deposit material on the substrates, and instead only discloses applications that are non-analogous to a substrate processing chamber component.

Furthermore, the claimed component is not obvious over Aguero et al. because it would not be obvious to one of ordinary skill in the art that the component of Aguero et al. would be suitable for the processing of a substrate in a chamber. As described in the background section of the specification, a substrate processing chamber component should meet certain requirements specific to the processing of substrates. For example, the component should be resistant to corrosion by energized gases used in chamber processes, such as for example RF or microwave energized etching gases such as CF_4, cleaning gases and deposition gases, which gases can comprise energized ionic and radical species that can aggressively chemically react and physically bombard and etch components. Aguero et al. discloses protection against, for example, the corrosive environment of gas turbines and the environment of chemical processing equipment, but does not disclose that these environments involve exposure to, for example, RF or microwave energized ionic or radical corrosive gas species, and thus does not teach or suggest that the coated component would be suitable for use in a substrate processing chamber.

Also, as described in the background section of the specification, the corrosion resistance of the substrate processing chamber component in the energized gas environment should be sufficiently high such that contamination of a substrate does not arise from falling or flaking of component material onto the substrate. Thus, a level of corrosion resistance is required not only to protect the component, but also the level should be sufficiently high to avoid contamination of the substrate. Aguero et al. discloses protective part coatings "to maintain the mechanical integrity of the part" (column 1, lines 17-28), such as for example a gas turbine coating that protects the turbine itself, but Aguero et al. does not disclose that the coating has a sufficiently high corrosion resistance that would reduce flaking of material and contamination of a substrate during processing, and in particular does not disclose that sufficient corrosion resistance exists upon exposure of the coating to the types of energized gases used in substrate processing. Accordingly, as Aguero et al. does not teach or suggest a substrate processing chamber component having the recited integral coating, claim 1 and the claims depending therefrom are patentable over Aguero et al.

The Examiner rejected claims 9 and 10 under 35 U.S.C. 103(a) as being unpatentable over Goward et al. This rejection is traversed.

Claim 1, from which claims 9 and 10 depend, is patentable over Goward et al. because Goward et al. does not teach or suggest "a substrate processing chamber component comprising a metal structure having an integral surface coating of an yttrium-aluminum compound," as recited in the claim. Instead, as discussed above, Goward et al. discloses "a coating alloy for the gas turbine engine super-alloys," (abstract) but does not teach or suggest a component for a substrate processing chamber as recited in the claim, and thus the disclosure of Goward et al. is non-analogous to the claimed substrate processing chamber component. The claim is furthermore not obvious over Goward et al. because one of ordinary skill in the art would not find it obvious that the gas turbine coating of Goward et al. would also be suitable in a substrate processing chamber. As described above, a component for a substrate processing chamber should be resistant to corrosion in energized gases

having, for example, RF or microwave energized ion and radical species of etching or cleaning gases, and also should have a sufficiently high level of corrosion resistance to provide acceptably uncontaminated substrates. Goward et al. discloses the importance of "oxidation resistant alloys" (column 1, lines 7-8), but does not disclose that the coating has sufficient corrosion resistance in a substrate processing environment with energized process gas species. Accordingly, one of ordinary skill in the art would not find it obvious to use the coated alloy of Goward et al. in a substrate processing chamber.

Furthermore, Goward et al. does not teach or suggest the integral coating, and instead, as discussed above, discloses that "the alloy is applied as a coating to the surface to be protected" (emphasis added column 4, lines 18-19.) Goward et al. does not teach or suggest the desirability of an integral coating that is absent a discrete boundary layer with an underlying structure, and also does not teach or suggest a method of forming such a coating. Accordingly, claim 1 and the claims depending therefrom are patentable over Goward et al.

The Examiner rejected claims 9, 10, 36 and 37 under 35 U.S.C. 103(a) as being unpatentable over Jackson et al. This rejection is traversed.

Claim 1, from which claims 9 and 10 depend, is patentable over Jackson et al. because Jackson et al. does not teach or suggest "a substrate processing chamber component comprising a metal structure having an integral surface coating of an yttrium-aluminum compound," as recited in the claim. Instead, as discussed above, Jackson et al. discloses "aluminide-based bond coat on articles exposed to high temperatures, such as components of turbines and engines" (emphasis added, column 1, lines 13-15), but does not teach or suggest a component for a substrate processing chamber, and thus the disclosure of Jackson et al. is non-analogous to the claimed substrate processing chamber component. Furthermore, a component suitable for a substrate processing chamber is not obvious from a disclosure of a turbine because, as described above, the substrate processing chamber environment has energized gas

species, such as RF or microwave energized ionic and radical species, and gas compositions such as etching and cleaning gases, that are other than those found in a gas turbine environment. As such, a component that has corrosion resistance as a gas turbine would not obviously have corrosion resistance in a substrate processing chamber environment, and also would not obviously provide a sufficient level of corrosion resistance to reduce contamination of substrates being processed in the chamber. Accordingly, as Jackson et al. does not teach or suggest the substrate processing chamber component of claim 1, claim 1 and the claims depending therefrom are patentable over Jackson et al.

Claim 36 is patentable over Jackson et al. because Jackson et al. does not teach or suggest "a component for a substrate processing chamber, the component comprising: a structure having a coating capable of being exposed to a plasma in the substrate processing chamber, the coating comprising yttrium-aluminum oxide having a compositional gradient through a thickness of the coating," (emphasis added) as recited in the claim. Instead, as discussed above, Jackson et al. discloses a coating for a turbine or engine, but does not teach or suggest a coated component for a processing chamber that processes substrates. Accordingly, claim 36 and the claims depending therefrom are patentable over Jackson et al.

The Examiner rejected claims 9 and 10 under 35 U.S.C. 103(a) as being unpatentable over Morita et al. This rejection is traversed.

Claim 1, from which claims 9 and 10 depend, is patentable over Morita et al. because Morita et al. does not teach or suggest "a substrate processing chamber component comprising a metal structure having an integral surface coating of an yttrium-aluminum compound," (emphasis added) as recited in the claim. Instead, as discussed above, Morita et al. discloses a ceramic base, namely alumina, that has a YAG layer, but does not teach a metal structure having an integral surface coating. The claimed component is furthermore not obvious over Morita et al., because Morita et al. does not teach or suggest any benefits of providing a metal structure having an integral

surface coating, and furthermore does not teach or suggest any method of forming a metal structure having an integral surface coating. Morita et al. discloses that yttrium is added to an alumina powder mixture to "generate required YAG which is exuded to and deposited on the surface of the sintered body of alumina and improve plasma resistance" (paragraph 40.) Thus, Morita et al. discloses sintering a ceramic having yttria to form a protective layer of YAG thereover, but does not teach or suggest any means by which an integral surface coating could be formed on a metal structure, and does not teach or suggest the desirability of a coating on a metal structure. Accordingly, claim 1 and the claims depending therefrom are patentable over Morita et al.

The Examiner rejected claims 29-35 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,365,010 to Hollars in view of Morita et al. This rejection is traversed.

Claim 29 is patentable over Hollars and Morita et al. because neither of the references teaches or suggests a substrate processing apparatus "wherein one or more of the process chamber wall, substrate support, substrate transport, gas supply, gas energizer and gas exhaust, comprises a metal structure having an integral surface coating of an yttrium-aluminum compound," as recited in the claim. Hollars discloses "a sputtering apparatus" (abstract.) However, as stated by the Examiner in the Office Action mailed on July 9 , 2003, "Hollars does not teach the claimed Y-Al coating." Morita et al. does not make up for the deficiencies of Hollars because, as described above, Morita et al. does not teach or suggest a coating of an yttrium-aluminum compound that is integral with a metal structure, and instead discloses a ceramic base having an overlying YAG layer. Accordingly, as neither Hollars or Morita et al. teach or suggest the recited metal structure having the integral surface coating, claim 29 and the claims depending therefrom are patentable over Hollars in view of Morita et al.

The Examiner rejected claims 29-35 under 35 U.S.C. 103(a) as being unpatentable over Hollars in view of Murakawa et al. This rejection is traversed.

Claim 29 is patentable over Hollars and Murakawa et al. because neither of the references teaches or suggests the recited metal structure having the integral surface coating of a yttrium-aluminum compound. Hollars discloses "a sputtering apparatus" (abstract) but, as stated by the Examiner in the Office Action mailed on July 9 , 2003, "Hollars does not teach the claimed Y-Al coating." Murakawa et al. does not make up for these deficiencies. As discussed above, Murakawa et al. discloses a ceramic material, but does not teach or suggest a metal structure having a coating. Furthermore, Murakawa et al. does not teach or suggest a structure having an integral surface coating, and instead discloses a window member "in the form of a transparent substrate of, for example, glass or sapphire having a surface to which a thin YAG sintered body is applied" (column 13, lines 59-62.) Thus, Murakawa et al. discloses applying a sintered YAG ceramic to a surface to form a coating, thereby forming a component having a discrete boundary line between the applied YAG ceramic and surface, but does not teach forming a coating that is integral with a structure that is absent a discrete boundary layer with the structure. Furthermore, as Murakawa et al. discloses that the substrate is "transparent," one of ordinary skill in the art would have been taught away from forming a coating on a metal structure that is non-transparent. Accordingly, as Hollars and Murakawa et al. do not teach or suggest the recited metal structure having the integral surface coating, claim 29 and the claims depending therefrom are patentable over Hollars in view of Murakawa et al.

CONCLUSION

The above-discussed amendments are believed to place the present application in condition for allowance. Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,

JANAH & ASSOCIATES, P.C.

Date: October 7, 2003 By: _____

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